

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions or listings of claims for this application.

Listing of Claims:

1. (Currently amended) A pixel cell comprising:
 - a substrate;
 - a photosensor in said substrate, said photosensor including a first conductivity area below a surface of said substrate and a second conductivity area at least between said first conductivity area and said substrate surface; and
 - a first material layer having an excess charge sufficient to create an electric field that affects said second conductivity area, wherein said first material layer is located above said surface of said substrate, at least over said photosensor and comprises a material selected from the group consisting of aluminum oxide, aluminum nitride, and aluminum silicates.
2. (Original) The pixel cell of claim 1, wherein said photosensor is a pinned photodiode.
3. (Currently amended) The pixel cell of claim 1, further comprising an isolation region spaced from said photosensor, wherein said isolation region has a bottom and sidewalls ~~with said first layer deposited thereon~~ at least said sidewalls having an associated second material layer having an excess charge sufficient

to create an electric field which affects said second conductivity area.

4. (Currently amended) The pixel cell of claim 3 1, ~~further comprising a second layer on a surface of said substrate over said isolation region and said photosensor~~ wherein said first layer is aluminum oxide.
5. (Canceled).
6. (Currently amended) The pixel cell of claim 5 1, wherein said first ~~and second layers~~ layer ~~comprise a high-k dielectric material~~ is aluminum nitride.
7. (Currently amended) The pixel cell of claim 6 1, wherein said ~~high-k dielectric material has an excess negative charge~~ first layer is an aluminum silicate.
8. (Canceled).
9. (Currently amended) The pixel cell of claim 5 3, wherein said second conductivity area maintains holes at said substrate surface and at a surface of said isolation region sidewall.
10. (Currently amended) The pixel cell of claim 5 3, wherein said field prevents a depletion region of said photodiode from reaching at least one of said ~~STI~~ isolation region and said substrate surface.
11. (Canceled).
12. (Canceled).
13. (Canceled).

14. (Currently amended) The pixel cell of claim ~~5~~ 3, further comprising a dielectric layer between said first material layer ~~of high-k dielectric material~~ and said substrate.
15. (Original) The pixel cell of claim 14, wherein said dielectric layer comprises silicon dioxide.
16. (Currently amended) A pixel cell comprising:
 - a substrate having a first conductivity type;
 - a pinned photodiode in said substrate and having a charge collection region of a second conductivity type and an accumulation region of said first conductivity type at least over said charge collection region; ~~and~~
 - an isolation trench adjacent to said pinned photodiode, wherein sidewalls of said isolation trench have a charge density sufficient to maintain a field in an adjacent portion of said accumulation region and a surface of said substrate has a charge density sufficient to maintain an electric field in an adjacent portion of said accumulation region; and
 - a first material layer having a material selected from the group consisting of aluminum oxide, aluminum nitride, and aluminum silicates on a surface of said substrate over said pinned photodiode.
17. (Currently amended) The pixel cell of claim 16, wherein said sidewalls ~~and said surface of said substrate each~~ comprise a second material layer of high-k dielectric material.

18. (Original) The pixel cell of claim 17, wherein said first conductivity type is p-type and said second conductivity type is n-type.
19. (Original) The pixel cell of claim 18, wherein said charge density is negative charge density.
20. (Currently amended) The pixel cell of claim 18, wherein said first and second layers of ~~high-k dielectric material~~ have an excess negative charge.
21. (Currently amended) The pixel cell of claim 20, wherein said second material layer of high-k dielectric material is selected from the group consisting of aluminum oxide, aluminum nitride, and aluminum silicates.
22. (Original) The pixel cell of claim 20, wherein said isolation trench is filled with a high-k dielectric material having an excess negative charge.
23. (Currently amended) The pixel cell of claim 17, wherein said sidewalls and said surface of said substrate further comprise a layer of dielectric material between said first and second material layers ~~layer of high-k dielectric material~~ and said substrate.
24. (Original) The pixel cell of claim 23, wherein said dielectric material is silicon dioxide.
25. (Canceled).
26. (Canceled).

27. (Canceled).
28. (Canceled).
29. (Currently amended) The pixel cell of claim 16, further comprising a silicon dioxide layer located under said first material layer and in contact with said substrate.
30. (Currently amended) An imager device comprising:
 - an image processor; and
 - a pixel array for supplying signals to said image processor, at least one pixel of said array comprising:
 - a substrate;
 - a photodiode within said substrate;
 - an isolation trench within said substrate; and
 - a lining layer in said isolation trench, comprising a layer of high-k dielectric material; and
 - a surface layer on a surface of said substrate located over said photodiode, comprising a layer of high-k dielectric material selected from a group consisting of aluminum oxide, aluminum nitride, and aluminum silicates.
31. (Original) The imager device of claim 30, further comprising a dielectric layer between said isolation trench and said lining layer.
32. (Original) The imager device of claim 31, wherein said dielectric layer extends over said surface of said substrate, between said surface layer and said surface of said substrate.

33. (Original) The imager device of claim 31, wherein said dielectric layer comprises silicon dioxide.
34. (Original) The imager device of claim 30, wherein said lining layer has an excess charge sufficient to maintain a field in a first portion of an accumulation region of said photodiode.
35. (Currently amended) The imager device of claim 34, wherein said surface layer has an excess charge sufficient to maintain a field in a second portion of said accumulation region of said photodiode.
36. (Currently amended) The imager device of claim 35, wherein said lining layer ~~and said surface layer are~~ is a high-k dielectric ~~materials~~ material selected from a group consisting of aluminum oxide, aluminum nitride, and aluminum silicates.
37. (Original) The imager device of claim 30, further comprising a filling layer located over said lining layer, filling said isolation trench.
38. (Currently amended) The imager device of claim 37, wherein said filling layer is selected from a group consisting of silicon dioxide, silicon nitride, oxide-nitride, nitride-oxide, and oxide-nitride-oxide.
39. (Currently amended) A pixel cell comprising:
a photodiode in a substrate;
a first layer of aluminum oxide on said substrate over said photodiode;

an isolation trench in said substrate and having a bottom and
sidewalls adjacent to said photodiode;
a layer of silicon dioxide on said bottom and said sidewalls of said
isolation trench; and
a second layer of aluminum oxide over said layer of silicon
dioxide.

40. (Currently amended) The pixel cell of claim 39, further
comprising a layer of silicon dioxide ~~on~~ between a surface of said
substrate over said photodiode and said first layer of aluminum
oxide.
41. (Canceled).
42. (Original) The pixel cell of claim 39, wherein said isolation trench
is filled with aluminum oxide.

Claims 43-66 (Canceled).

67. (New) The pixel cell of claim 16, wherein said first layer is
aluminum oxide.
68. (New) The pixel cell of claim 16, wherein said first layer is
aluminum nitride.
69. (New) The pixel cell of claim 16, wherein said first layer is an
aluminum silicate.
70. (New) The pixel cell of claim 30, wherein said first layer is
aluminum oxide.

71. (New) The pixel cell of claim 30, wherein said first layer is
aluminum nitride.
72. (New) The pixel cell of claim 30, wherein said first layer is an
aluminum silicate.